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10/565,534	03/01/2006	Kouhei Ohnishi	SAT.47	2148

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EXAMINER	
ORTIZ RODRIGUEZ, CARLOS R	

ART UNIT	PAPER NUMBER
2123	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/565,534	OHNISHI ET AL.	
	Examiner	**Art Unit**	
	CARLOS ORTIZ RODRIGUEZ	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _02 December 2008_.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-6_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-6_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _11/04/08_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-6 are pending.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/02/08 has been entered.

Response to Arguments

3. Applicant's arguments filed 11/04/08 have been fully considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nowlin et al. U.S. Patent No. 6,879,880 (hereinafter Nowlin) in view of Murakami et al., "Force Sensorless Impedance Control By Disturbance Observer", IEEE 1993.

a. Regarding claims 1-6 please note that the term "estimating/estimated" as utilized throughout the claims is being interpreted as "making an approximate calculation".

b. **Regarding claim 1**, Nowlin discloses a position and force control device, comprising; (i) position detection means for detecting a position of an object (this feature is intrinsic to servo motors, see for example C1 L56-67 and C10 L12-27); (ii) driving means for driving the object (this feature is intrinsic to servo motors, see for example C1 L56-67 and C10 L12-27); and (iv) control means for calculating a first acceleration signal from the reaction force which the object undergoes and a goal force signal, and further calculating a second acceleration signal from the position signal and the goal position, and outputting a generated signal to said driving means, the generated driving signal being based on said first and second acceleration signals (see for example C9 L40-67 and C10). *Please note the disclosed basic master/slave scheme and the generic control systems theory, regarding calculating error signals based on the difference between the actual position and "desired positions".*

But Nowlin fails to clearly specify a reaction force detection means for estimating a reaction force which the object receives, where the reaction force is

detected indirectly based on a position signal outputted from the position detection means and a driving signal applied to the driving means.

However, Murakami discloses that the reaction force detection means for estimating a reaction force which the object receives, where the reaction force is detected indirectly based on a position signal outputted from the position detection means and a driving signal applied to the driving means (see Fig 3 and Section Labeled “C. Reaction Torque Estimation Observer”).

Nowlin and Murakami are analogous art because they are from the same field of endeavor. They both relate to positioning and force control systems.

Therefore at time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the above teachings disclosed by Nowlin and combining them with the teachings disclosed by Murakami.

One of ordinary skill in the art would have been motivated to do this modification in order to avoid deterioration of the robustness of the system as suggested by Murakami (see for example, Page 356 Column 1).

c. **Regarding claim 2**, Nowlin discloses a position and force control device for controlling the position of an object and force on the object in response to position command signals and force command signals, comprising: (i) driving means for driving the object (this feature is intrinsic to servo motors, see for example C1 L56-67 and C10 L12-27); (ii) position detection means for detecting a position of the object (this feature is intrinsic to servo motors, see for example C1 L56-67 and C10 L12-27); (iv) first calculation means for calculating a

difference between a position command signal and a position signal outputted by the position detection means and converting the difference to a first acceleration signal (see for example C9 L40-67 and C10, *please note the disclosed basic master/slave scheme and the generic control systems theory, regarding calculating error signals based on the difference between the actual position and "desired positions")*; (v) second calculation means for calculating a second difference between the reaction force detected by the reaction force detection means and a force command signal and converting the second difference to a second acceleration signal; and (vi) control means for adding the said first and second acceleration signals and outputting a generated driving signal to the driving means, the generated driving signal being on said first and second acceleration signal (C9 L40-67, C10 and C15 L40-65). *Please note that position, velocity and acceleration are all mathematically related, requiring only basic mathematically manipulations to derive one from the other.*

But Nowlin fails to clearly specify a reaction force detection means for estimating the reaction force undergone by the object from an acceleration signal estimated from a position signal outputted by the position detection means and from a driving signal transmitted to the driving means.

However, Murakami discloses that the reaction force detection means for estimating the reaction force undergone by the object from an acceleration signal estimated from a position signal outputted by the position detection means and from a driving signal transmitted to the driving means (see Fig 3 and Section Labeled "C. Reaction Torque Estimation Observer").

Nowlin and Murakami are analogous art because they are from the same field of endeavor. They both relate to positioning and force control systems.

Therefore at time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the above teachings disclosed by Nowlin and combining them with the teachings disclosed by Murakami.

One of ordinary skill in the art would have been motivated to do this modification in order to avoid deterioration of the robustness of the system as suggested by Murakami (see for example, Page 356 Column 1).

d. **Regarding claim 3**, Nowlin discloses a position and force control device for controlling positions of an object on a slave side and of an operation part on a master side in response to a position difference between the operation part on the master side and the object on the slave side to drive the object with driving force in response to an operation force on the master side and transmit a reaction force of the slave side to the master side (C10 L1-11), comprising: (i) first driving means for driving the operation part on the master side(this feature is intrinsic to servo motors, see for example C1 L56-67 and Figures 9A-9C); (ii) first position detection means for detecting a first position of the operation part on the master side (this feature is intrinsic to servo motors, see for example C1 L56-67 and C10 L12-27); (iv) second driving means for driving the object on the slave side; (v) second position detection means for detecting a second position of the object on the slave side; (vii) first calculation means for calculating a difference between the first position signal outputted by the first position detection means

and the second position signal outputted by the second position detection means and converting the said difference to the first and second acceleration signals for controlling the master side and the slave side; (viii) second calculation means for calculating a sum of outputs of the first and the second reaction force detection means, and converting the sum to the third and fourth acceleration control signals for controlling the master side and the slave side; (ix) first addition means for adding the first and the third acceleration control signals; (x) second addition means for adding the second and the fourth acceleration control signals (see for example C9 L40-67 and C10, *please note the disclosed basic master/slave scheme and the generic control systems theory, regarding calculating error signals based on the difference between the actual position and "desired positions")*; (xi) first control means for outputting a first generated driving signal to the operation part on the master side based an output of the first addition means; and (xii) second control means for outputting a second generated driving signal to the object on the slave side based on an output of the second addition means (C9 L40-67, C10 and C15 L40-65). *Please note that position, velocity and acceleration are all mathematically related, requiring only basic mathematically manipulations to derive one from the other.*

But Nowlin fails to clearly specify a reaction force detection means for estimating a reaction force which the object receives, where the reaction force is detected indirectly based on a position signal outputted from the position detection means and a driving signal applied to the driving means.

However, Murakami discloses that the reaction force detection means for estimating a reaction force which the object receives, where the reaction force is detected indirectly based on a position signal outputted from the position detection means and a driving signal applied to the driving means (see Fig 3 and Section Labeled “C. Reaction Torque Estimation Observer”).

Nowlin and Murakami are analogous art because they are from the same field of endeavor. They both relate to positioning and force control systems.

Therefore at time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the above teachings disclosed by Nowlin and combining them with the teachings disclosed by Murakami.

One of ordinary skill in the art would have been motivated to do this modification in order to avoid deterioration of the robustness of the system as suggested by Murakami (see for example, Page 356 Column 1).

e. **Regarding claim 4**, the combination of Nowlin and Murakami discloses all the limitations of the base claims as outlined above. Murakami further discloses wherein the reaction force detection means comprises at least two reaction force estimation observers, wherein the reaction force estimation observers indirectly sense reaction forces based on the driving signal and the position signal (see Page 354, Fig 3 and Column 1, see for example that the observer of i-th joint estimates only the self-inertia variation torque. Then other joint observers estimate the interactive torque proportional to the angular acceleration of i-th joint).

f. **Regarding claim 5**, the combination of Nowlin and Murakami discloses all the limitations of the base claims as outlined above. Murakami further discloses wherein the reaction force detection means comprises at least two reaction force estimation observers, wherein the reaction force estimation observers indirectly sense reaction forces based on the driving signal and the position signal (see Page 354, Fig 3 and Column 1, see for example that the observer of i-th joint estimates only the self-inertia variation torque. Then other joint observers estimate the interactive torque proportional to the angular acceleration of i-th joint).

g. **Regarding claim 6**, the combination of Nowlin and Murakami discloses all the limitations of the base claims as outlined above. Murakami further discloses wherein the first and second reaction force detection means each comprise a force estimation observer that indirectly senses reaction forces based on the first driving signal and the first position signal or the second driving signal and the second position signal respectively (see Page 354, Fig 3 and Column 1, see for example that the observer of i-th joint estimates only the self-inertia variation torque. Then other joint observers estimate the interactive torque proportional to the angular acceleration of i-th joint).

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carlos Ortiz-Rodriguez whose telephone number is 571-272-3766. The examiner can normally be reached on Mon-Fri 10:00 am- 6:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached on 571-272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Carlos Ortiz-Rodriguez
Patent Examiner
Art Unit 2123

February 20, 2009

/Paul L Rodriguez/

Supervisory Patent Examiner, Art Unit 2123